Stress during the rebuilding phase influenced mental health following two Queensland flood disasters more than the event itself.

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ABSTRACT: *It has long been known that disasters can have mental health consequences such as increased rates of PTSD, depression and anxiety. While some research has shown that secondary stressors during the aftermath of a disaster can influence psychological outcomes, this aspect of the disaster experience has not been widely studied. This paper reports on two studies that investigated which aspects of the experience of being flooded were most predictive of mental health outcomes. The first study was a qualitative study of adults whose homes had been inundated in the Mackay flood of 2008 (n=16). Thematic analysis of interviews conducted 18-20 months post-flood found that stressors during the flood aftermath such as difficulties and delays during the rebuilding process and a difficult experience with an insurance company were nominated as the most stressful aspect of the flood by the majority of participants. The second study surveyed Mackay flood survivors three and a half years post-flood, and Brisbane 2011 flood survivors 7-9 months post-flood (n=158). Findings indicated aftermath stress contributed to mental health outcomes over and above the contribution of perceived trauma, objective flood severity, prior mental health, self-efficacy and demographic factors. The implications of these results for the provision of community recovery services following natural disasters are discussed, including the need to provide effective targeting of support services throughout the lengthy rebuilding phase; a possible role for co-ordinating tradespeople; and training for insurance company staff aimed at minimising the incidence of insurance company staff inadvertently adding to disaster victims' stress.*

Keywords: *Disaster, mental health, PTSD, depression, stress.*

Introduction

Flooding is the most common and deadly kind of natural disaster, accounting for 48.2% of reported natural disasters and affecting 32 million people globally in 2013 (Crabtree, 2013; Guha-Sapir et al., 2014). Floods are very common in Australia, and 2008 and 2011 saw widespread flooding across the country. In early 2008 around two thirds of the state of Queensland was affected by flood waters and Queensland was again severely flooded in 2011, including the state capital, Brisbane. The 2011 events were even more devastating in

terms of lives lost and property damage. The 2010-2011 series of floods and cyclones have been estimated to have affected about 1.7 million Queensland adults in some way, with 24000 adults reporting persisting distress five months later (Clemens et al., 2013).

Posttraumatic stress disorder, depression, and anxiety are all commonly reported following disasters (Norris et al., 2002), although resilience (a brief transient stress reaction followed by stable functioning) is the most common psychological outcome (Bonanno et al., 2007). A number of variables have been identified as potential risk or protective factors, including severity of disaster exposure (Neria et al., 2008), subjective trauma experience (Ozer et al., 2008), self-efficacy (Benight & Bandura, 2004; Hirschel & Schulenberg, 2009), and prior psychiatric history (McMillen et al., 2002; Ozer et al., 2008). However, it is not clear which of these factors are most important in predicting positive and negative psychological outcomes.

In addition, while it is clear that it can take many months for life to return to normal following a disaster, few studies have investigated the psychological impact of the protracted rebuilding and recovery phase in the aftermath. A qualitative study of the Carlisle, UK, 2005 flood (Carroll et al., 2010) found that participants attributed their psychological symptoms to flood related stress factors that continued during the long rebuilding phase, which in many cases lasted over a year. They identified primary flood-related stressors such as danger from the floodwaters, damage to property and possessions, evacuation, issues related to being displaced, and living conditions while homes were damaged. They also identified secondary stress factors such as disputes with insurance companies, builders and other agencies during this repair phase. However, few quantitative studies have investigated the impact of the length of time taken to rebuild homes, or the impact of secondary stressors during the aftermath period.

There is a well-established literature causally linking both episodic and chronic stress with depression, in particular (Hammen, 2005). While most people who are exposed to a negative life event do not become depressed, there is strong evidence that the majority of episodes of depression are preceded by a stressful life event. Further, there is evidence that there is a strong relationship between the number and severity of stressful events and depression (Kendler et al., 1998). The research regarding chronic or ongoing stress, while receiving less research attention than episodic stress and being hampered by difficulties with definitions, provides evidence that chronic stress may be a more potent predictor of depression that acute stress (Hammen, 2005; McGonagle & Kessler, 1990).

Stress (both acute and chronic) has been found to impact negatively on mental and physical health. Current neurobiological understanding of the physiological stress response suggests that very intense or prolonged stress can result in inflammatory processes in the brain that affect brain functioning and contribute to the onset or maintenance of some psychiatric illnesses such as posttraumatic stress disorder, major depression, anxiety disorders and schizophrenia (García-Bueno et al., 2008).

The current research aimed to investigate the factors predicting psychological outcomes following two Australian floods using a mixed methods design. The first study was a qualitative study that aimed to explore which aspects of the flood and its aftermath affected people found to be most stressful. The second study, using a questionnaire developed from the themes identified in the first study, investigated the role of flood related stressors in predicting posttraumatic stress symptoms and depression, while a range of known predictive factors were held constant.

Study 1

The first study was a qualitative study of people affected by the 2008 flood that impacted the northern Australian town of Mackay. This study has been reported on in more detail in Dixon etal. (2015), and only relevant aspects will be summarised here. The aim was to explore what it was like to live through the flood, with a focus on the aspects of the flood and its aftermath that were particularly stressful or helpful for affected people.

Study 1 Method

Semi-structured interviews were conducted 18-20 months post-flood, with 16 adults (10 females and 6 males). Participants ranged in age from 31 to 82 years, with a mean age of 50.25 years (*SD* = 15.22). Participants were asked what they found to be most stressful during their flood experience; what support and services they found to be helpful or unhelpful; how the flood affected their psychological health and well-being; and what strategies they found to be helpful in coping with the stress caused by the flood.

Study 1 Results

The following is a summary of the results regarding flood related stress factors. Thematic analysis identified two constituent themes concerning flood related stressors: stressors that occurred on the day of the flood and those that occurred during the aftermath. Day of the flood stressors included three dimensions: frightening experiences, worry about others and feeling helpless. Table 1 provides illustrative quotes for each of these dimensions. All names are pseudonyms.

Table 1. Day of the flood stressors.

Frightening experiences	"I think that was the worst part, that strong current. So the worst, the most stressful thing was, yeah, I thought we may well die." (Patricia, 52)
Worry about others (including pets)	"The first thing the cat did was jump down and start swimming back into the house… It's really hard when you've got pets." (Tracey, 31)
Feeling helpless	"I suppose cause it was such a shock, because there wasn't a warning and nobody knew what was going on, it was sort of what do we do? Does anyone know, what's going on? We need someone in charge." (Melissa, 33)

Most participants described some aspect of the aftermath when asked what the most stressful aspect of the flood was. The most commonly mentioned aftermath stressors comprised eight dimensions. Table 2 provides some illustrative quotes.

Table 2. Aftermath stressors.

Insurance issues	"My insurance company were a bit slow to come to the rescue. And they made me get quotes for absolutely everything. I had to write down every single thing that had been destroyed from you know, like a table cloth to a lawn mower and I had to then get that quoted on by the big stores." (Melissa, 33)
Clean up	"There was a big thick mould all over the ceiling and all on the carpets. The sewerage had also backed up… So I think the biggest problem with that was the mammoth clean-up process, and things weren't just wet." (Rachel, 32)
Problems with rebuild	"The on-going thing of what are [the builders] going to be like when I talk to them this time? You know, they haven't done this right… I think the time it took to get back into the house was probably the thing. It just went on and on and on and on." (Rachel, 32)
Disruption to normal life	"We have a leasing business, our main source of income you could say, and I had a small [suitcase] full of documents. And that nearly drove me nuts keeping up with those and making sure they didn't get in a mess [during multiple moves]" (Doug, 82)
Failure of expected support	"They don't understand what it's like. They don't understand how much work it is and say well, at least you've got insurance. So yes, I have got insurance so that's good. However they don't understand the work that's involved in sorting it all out. " (Darlene, 44)
Loss of possessions	"If you'd had the time it would have been nice to sit down and try and resurrect some of the photos… No money can return those memories." (Bill, 56)
Relocation	"We were out of the unit for about 3 months. We had 6 moves... It was stressful moving from one place to another." (Mavis, 82)
Living in inadequate conditions	"We had nowhere else to go. We had no running water, we didn't have proper toilet facilities, it was awful." (Patricia, 52)

Study 2

The aim of this study was to investigate which factors best predicted psychological outcomes 7-9 months after the Brisbane 2011 flood and 3.5 years after the Mackay 2008 flood. In particular, this study aimed to investigate the role of factors that occurred in the aftermath of the floods in predicting outcomes. In order to do this a questionnaire was developed using themes identified in the qualitative study. Principal components analysis separated the flood related stressors into two factors: aftermath stress and insurance experience. Other independent variables were chosen because they had been shown to influence outcomes in previous research: severity of disaster exposure, perceived trauma, prior mental health, and self-efficacy.

The specific hypothesis to be tested was as follows: Symptoms of posttraumatic stress and depression will be predicted by post-flood factors such as severity of perceived stress in the aftermath of the flood and stress related to the insurance claim process when controlling for known predisposing and flood related predictors such as flood severity, perceived trauma, age, gender, prior mental health, and self-efficacy.

Study 2 Method

Participants: The sample comprised 158 participants: 65 from Mackay (46 female and 19 male) and 93 from Brisbane (66 female and 27 male). The mean age was 50.98 years (*SD*=14.28, range 21-87). Participants were recruited through letterbox drops in Brisbane 7-9 months after the 2011 flood and doorknocking in Mackay 3.5 years post-flood. An on-line version was distributed via email to community and university networks. There were no significant differences between the two samples on any dependent or demographic variables.

Measures:

Posttraumatic stress symptoms - The Impact of Events Scale – Revised (IES-R, Weiss & Marmar, 1997). The IES-R assesses posttraumatic stress symptoms during the last seven days in relation to a particular traumatic event and has three subscales: Avoidance (8 items e.g. “I stayed away from reminders about it.”); Intrusions (7 items e. g. “Pictures about it popped into my mind.”) and Hyperarousal (7 items e. g. “I was jumpy and easily startled.”). It has 22 items measured on a 5-point Likert scale from 0 (*not at all*) to 4 (*extremely*).

Depression - The Depression Anxiety Stress Scales (short form) (DASS-21, Lovibond & Lovibond, 1995). This scale comprises 21 items (7 of which assess depression) scored on a 4-point Likert-style scale from 0 (*did not apply to me at all over the last week*) to 3 (*applied*

to me very much or most of the time over the past week). Example items include ‘‘I found it difficult to work up the initiative to do things," and "I felt that life was meaningless".

Aftermath stress – Flood Experience Questionnaire (FEQ, developed by the current authors from dimensions identified in the qualitative study). This factor assessed stress during the clean-up and rebuilding phases after the floods. Item examples included "During the months following the flood I felt exhausted," and "The clean-up following the flood was stressful." Items were rated on a 6-point Likert-style scale from 0 *(not at all*) to 5 (e*xtremely*). A "*Not applicable*" option was also included.

Insurance experience – FEQ. This factor assessed the degree to which participants found the insurance claim process to be stressful. Item examples included "My insurance company's staff were helpful"; "I was given conflicting information about what to do regarding insurance;" and "Insurance adequately covered my losses." Items were rated on the same 6-point scale described for Aftermath Stress.

Insurance coverage – Participants were asked "What level of insurance did you have at the time of the flood?" Response options were: *"Fully insured"; "Not insured at all or inadequately insured";* or *"Believed you were covered but the insurance company rejected the claim".*

Water height – Participants were asked: "At the time of the flood, how much water came into your home?" Five response options ranged from "*No significant inundation to home" to "Over 50cm water through entire home".*

Repair time – Participants were asked "The time to repair your home to satisfactory standard was: *"More than six months", "One to six months", "Less than one month", No repairs required",* or *"Not applicable".*

Perceived trauma: Participants were asked to rate how traumatic they found the flood experience to be on a 7-point scale from (0) "*Not at all*" to (6) "*Extremely*".

General perceived self-efficacy - The General Perceived Self-Efficacy Scale (GPSE, Scholz et al., 2002). It is a 10-item scale using a 4-point Likert-style scale, ranging from 0 (*Not true*) to 3 (*Exactly true).* Example items are: "I can always manage to solve difficult problems if I try hard enough," and "I can remain calm when facing difficulties because I can rely on my coping abilities."

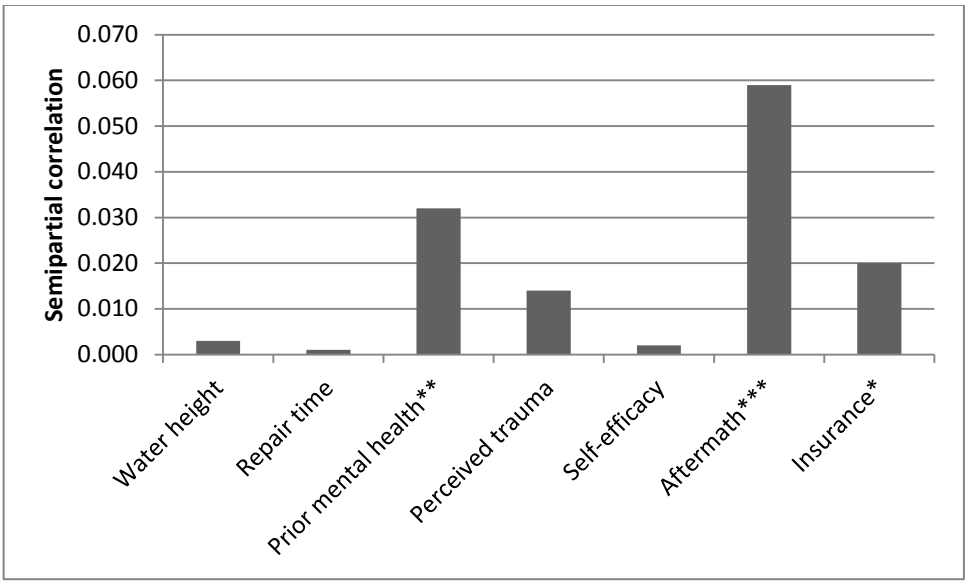
Prior mental health: "In the months prior to the flood I was suffering from depression, anxiety or mental illness (Scale of 0-5)."

Study 2 Results

Hierarchical multiple regressions were performed in order to test the hypothesis. The factors entered into the first step were those found to be key predictors of psychological outcomes in past research. These included age, gender, prior mental health, perceived trauma, self-efficacy and severity of flood exposure (water height and repair time). Together these control variables entered in the first step explained 28% of the posttraumatic stress variance and 27% of the variance in depression scores. The addition of aftermath stress and insurance experience added 9% to the posttraumatic stress explained variance (increasing the total to 37%) and a non-significant 3% of the variance in the case of depression.

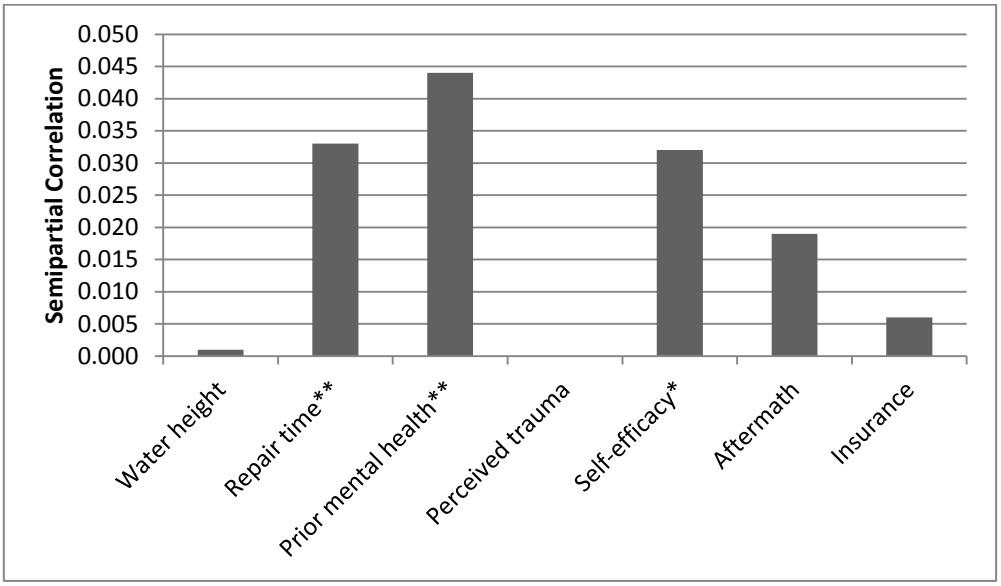
Aftermath stress was the strongest predictor of posttraumatic stress symptoms, as shown in the plot of semipartial correlations in Figure 1. Prior mental health and insurance experience also significantly predicted posttraumatic stress symptoms, but perceived trauma, floodwater height and repair time did not. Aftermath stress played a lesser role in predicting depression, but it approached significance and was a stronger predictor than either floodwater height or perceived trauma. Prior mental health, repair time and self-efficacy were the strongest predictors of depression, as shown in Figure 2.

Figure 1. Semi-partial correlations for the predictors of posttraumatic stress.



*p<.05, **p<.01, ***p< .001

Figure 2. Semipartial correlations for the predictors of depression.



*p<.05, **p<.01, ***p< .001

One-way between groups analyses of variance (ANOVA) with Bonferroni posthoc tests were performed to determine if there were any differences in outcomes for the people who were fully insured, uninsured and those who had their claims rejected. Having an insurance claim rejected was associated with higher rates of depression, $F(1,157) = 3.46$, p=.028, and the PTSD symptom of avoidance, than being fully insured, $F(1,157) = 3.05$, p=.048. People who were not insured at all did not differ significantly from either group.

Discussion

The severity of stress in the protracted rebuilding phase following the floods was the strongest predictor of posttraumatic stress symptoms, even after controlling for a number of other variables including objective disaster severity and subjective trauma. The predictors of depression appear to be more complex, although aftermath stress was a stronger predictor than the events that occurred on the day of the flood. Interestingly, the length of time for homes to be repaired was a key predictor of depression, suggesting that the length of time living in disrupted circumstances was associated with the development of depression. This finding supports previous research on the links between chronic stress and depression (Hammen, 2005).

The finding that aftermath stress predicted poor psychological outcomes was corroborated by the qualitative data and some aspects have also been found in previous research. Study 1 participants typically described some element of aftermath stress when asked what they found to be the most stressful aspect of the flood, as did the majority of Study 2 participants. Post-disaster stressors have been found to impact psychological

outcomes previously. For example, (Norris & Uhl, 1993) found a mediating role for hurricane-related chronic stress on the relationship between acute stress and outcomes, and (Burnett et al., 1997) found that disruption during the rebuilding phase following a hurricane predicted poor mental health outcomes. Despite evidence that disaster aftermath stress can affect outcomes, it is not considered in the majority of disaster research to date.

This study found two ways in which insurance company practices can affect disaster victims' mental health. Firstly, people who expected that their homes were fully insured but had their claims rejected were significantly more likely to be depressed or have the PTSD symptom of avoidance than people who received an insurance payout. Secondly, a stressful experience with an insurance company predicted posttraumatic stress symptoms, even when other variables were controlled for. Both findings have significant implications for the insurance industry, and suggest that changes in policies and practices could reduce psychological distress following disasters.

The finding that the insurance claim process was a significant stressor is supported by qualitative data from Study 1. Interviewees who found their insurance company to be helpful described less stress overall, whereas those who had difficulty with the insurance process were more likely to describe the flood aftermath period as extremely stressful. Some of the difficulties Study 1 participants described included long and stressful telephone conversations, being given conflicting information by different insurance company staff members, waiting for the insurance company to make a decision, insurance companies not covering houses since the flood, or not being adequately compensated for their losses. The finding that rebuilding time predicts depression suggests that it is important that assistance continues for as long as there is a need. Rebuilding from a natural disaster can take months or even years, and disaster victims can feel increasingly reluctant to ask for help as time goes on. Study 1 participants who still had uncompleted repairs eighteen months post-flood spoke of hiding this fact from friends for fear of being seen as not coping, or complaining. This also suggests there is a role for community recovery personnel to raise community awareness about the protracted nature of disaster recovery and ongoing need for emotional and instrumental support.

In addition to co-ordinating volunteer helpers, as occurred in Brisbane, government agencies could further assist community recovery by publicising messages about effective helping, identifying vulnerable people and areas, and assisting people with finding temporary accommodation. A number of Study 1 participants described difficulties finding alternate accommodation. Co-ordination of tradespeople so that they are not attempting to work on too

many jobs at one time could reduce unnecessary rebuilding delays, and advocacy or assistance, where needed, with insurance companies and tradespeople might also reduce undue stress.

Recommendations that have the potential to reduce undue stress caused by the insurance claim process include having streamlined procedures that apply in the case of declared disaster situations; training staff in these procedures; and providing claimants with clear, easy to follow instructions on how to make their claim. Study 1 participants reported that allowing photos of flooded items as evidence so contaminated items could be removed from the house quickly was allowed by some insurance companies but not others. Having to wait for an assessor to visit the property before the clean-up was an added stress and made cleaning more difficult and risky. Similarly, requiring quotes for all items in cases where all household contents have been lost added an unnecessary burden to disaster victims. Additionally, providing adequate training for staff so conflicting information is minimised would reduce a considerable amount of unnecessary stress on victims. Table 3 summarises these recommendations for community recovery personnel and insurance companies.

Table 3. Summary of Implications for Community Recovery and Insurance Companies.

Implications for community recovery:

- assistance can be required for a year or more
- raise community awareness about ongoing need for practical help and emotional support
- co-ordinating volunteer helpers
- publicising messages about effective helping
- identifying vulnerable people and areas
- assisting people with finding temporary accommodation
- co-ordination of tradespeople
- advocacy with insurance companies and tradespeople

Implications for insurance companies:

- clearly worded policies that reduce uncertainty about eligibility
- streamlined procedures that apply in the case of declared disaster situations
- training staff in these procedures
- providing claimants with clear, easy to follow instructions on how to make their claim
- allowing photos of flooded items as evidence
- not requiring quotes for all items in cases where all household contents have been lost
- providing adequate training for staff so conflicting information is minimised

A strength of this research was that it sampled people from two different sites, and despite there being some differences between the two flood events, the hypotheses were supported in both samples. This is important because the majority of disaster research focuses on single events. The generalizability of this study's findings is enhanced because of this corroboration following two separate events.

A limitation of the current research was the smaller than optimum sample size in Study 2. A larger sample size could also have strengthened the power of all the analyses that were performed. Also, as it was not a representative sample, it is difficult to know if respondents were typical of the population of flood affected people.

In conclusion, the key findings of this research were that aftermath stress was a key predictor of mental health outcomes following the floods, and a difficult experience with an insurance company was also predictive of poor outcomes. These results open up a number of new avenues for disaster research and disaster recovery policy and practice.

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